

## REMARKS

Claims 1, 3-16, 18-22, and 23-26 are in the case and presented for reconsideration.

Claims 2, 17 and 22 have been canceled.

Claims 1, 15, 16 and 23 have been amended to include the limitation of operating the solid liquid separator at a temperature of 110 C to 200 C and/or the limitation that impurities comprise 4-carboxybenzaldehyde, trimellitic acid, or 2,6-dicarboxyfluorenone. Support for these additional limitations can be found on page 8, lines 8-10 and page 16 lines 3-20, of the specification.

Claims 3, 4 and 7 have been amended to put the claims in proper form as a result of the amendments to claims 1 and 2.

Claims 18, 29 and 29 have been amended to include the limitation that the catalyst is at least one selected from the group consisting of cobalt, manganese and bromine compounds. Support for these limitations can be found on page 7, lines 14-16 and page 9 lines 2-5 of the specification.

Claim 25 has been amended to include the limitation the catalyst comprises a group VIII metal, support for this limitation can be found on page 19 lines 21-23.

**Rejections under Non-Statutory Double Patenting**

The timely filed terminal disclaimers are attached which are in compliance with 37 CFR 1.321(c) for the Application No. 10/645,737, and Application No.

10/645,731. Applicants respectively request that the double patenting rejection be removed.

**Claim Rejections under 35 U.S.C. § 112**

Claims 18, 23, 25 were rejected under 25 U.S.C 112, first paragraph. Applicants wish to respectfully point out to the examiner that many oxidation catalysts and hydrogenation catalysts are well known in the art. There are numerous oxidation patents with various catalyst systems. Therefore, applicants argue that claims 18, 23, and 25 are enabled as written. However, for the sake of advancing prosecution, the claims have been amended to include the limitation that the catalyst comprises cobalt compounds, manganese compounds, or bromine compounds and that the hydrogenation catalyst of claim 30 comprises a Group VIII metal. Therefore, applicants respectfully request that the 35 USC 112 rejections on claims 18, 23, and 25 be withdrawn.

Claims 1, 9, 11, 13, 16, 18, 20 and 23 are rejected under 35 USC 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. With regards to "impurities" applicants wish to direct the examiner attention to page 8 lines 8-10 where impurities is defined as follows: "The impurities typically comprise one or more of the following compounds: 4-carboxybenzaldehyde, trimellitic acid, and 2,6-dicarboxyfluorenone." An amendment has also been made to the corresponding claims as previously stated.

With regard to "staged oxidation product" applicants wish to point the examiner's attention to page 12, lines 8-15, which states "Additional air or molecular oxygen may be fed via conduit **100** to the staged oxidation zone **80** in an amount necessary to oxidize a substantial portion of the partially oxidized products such as 4-carboxybenzaldehyde (4-CBA) in the crude carboxylic acid slurry **30** or slurry product **70** to the corresponding carboxylic acid. Generally, at least 70% by weight of the 4-CBA is converted to terephthalic acid in the staged oxidation zone **80**. Preferably, at least 80% by weight of the 4-CBA is converted to terephthalic acid in the staged oxidation zone **80**." Therefore, the starting material, process conditions, and operations and the resultant product from the zone are defined. In other words, in an embodiment of the invention the stage oxidation product is defined as converting 70%, preferably 80% of the 4-CBA in the slurry product or crude carboxylic acid slurry to terephthalic acid.

In regard to "a crystallized product", in a similar manner, applicants draw examiner's attention to page 13 lines 21-23, and page 14 lines 1-15, where the process conditions, operation, equipment, and the b\* of the material are described. In summary, both the starting material, process equipment, and conditions, and color of the product is defined. Moreover, crystallizers and their function are well known in the art. MPEP 2173.02 states that "definiteness of claim language must be analyzed, not in a vacuum, but in light of: (a) the content of the particular application disclosure; (b) the teachings of the prior art; and (c) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made." Therefore, applicants respectfully state that the term "a crystallized product" is not indefinite.

Therefore, in response to the arguments above and amendments to the claims, applicants respectfully request that 35 USC 112, second paragraph rejections be removed for claims 1, 9, 11, 13, 16, 18, 20, 23 and 25.

### **Rejections under 35 U.S.C. § 102**

For clarification of the invention, claim 22 has been canceled. MPEP § 2131 states that “a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference”. MPEP sec. 2131 further states that “the elements must be arranged as required by the claim”. As will be pointed out below, Zeitlin et al. is very different from applicant’s invention.

### **Rejections under 35 U.S.C. § 103**

Claims 1-26 were rejected under 35 U.S.C. 103(a) as being unpatentable over Scott et al. (hereinafter “Scott”) in view of Zeitlin et al. (hereinafter “Zeitlin”).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143. The teaching or suggestion to make the claimed combination and the reasonable expectation of success

must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicants respectively state that there is no motivation for the combination of Zeitlin and Scott because of the large difference in the processes disclosed. Zeitlin refers to a process to reduce optical density of terephthalic acid by direct addition of water to selected crystallizers in a precipitative process based on hydrogenation and flask crystallization while the process in Scott is solvent based and does not involve hydrogenation. Applicant respectfully states that both Scott and Zeitlin are working to remove different impurities through vastly different processes, therefore, the objective of the inventions in Scott and Zeitlin are different as well.

With regards to claims 1 and 3-15 of applicant's invention, impurities which comprise 4-carboxybenzaldehyde, trimellitic acid, or 2,6-dicarboxyfluorenone are being removed by the use of solvent exchange wherein the solid liquid displacement zone comprises a solid liquid separator that is operated at a temperature between 110°C to 200°C. In Scott, the solid liquid separator is operated at a lower temperature. The higher temperature of the present invention keeps impurities in solution and allows them to be displaced. At lower temperatures, impurities are crystallized and cannot be displaced in the solid liquid displacement zone. Thus, in the present invention, there is a significant improvement in product quality, as shown in the working examples, when the solid liquid separation with liquor exchange is conducted at a higher temperature. Scott actually teaches away from this concept when it states in column 3 lines 50-55 concerning the product from the crystallizer the following: "The slurry from the crystallizer/oxidizer 17 (line 25) is then passed through two additional crystallizers 26

connected in series where the product is cooled to about 105°C following which cooled slurry is directed via line 27 to centrifuge 28. The centrifuge cake (line 29) is then reslurried in tank 30 with fresh acetic acid introduced via line 31.” Therefore, Scott specifically teaches away from utilizing a solid liquid separator at high temperature. Thus, there is no motivation to use a separator operating at higher temperatures. Zeitlin, on the other hand, is directed to a process where water is added to crystallizers to remove p-toulic acid, which neither Scott or the applicant's invention teaches.

In summary, Scott teaches sending a cooled slurry to the solid liquid separator. The applicant's invention is the exact opposite, and as stated previously, this results in a large amount of impurities being displaced and removed in the solid liquid displacement zone that does not need to be removed later on in the process. Applicant also wishes to point the examiner's attention to the text in the application on page 16 lines 13-20 where it is disclosed that additional solvent is added, and the mother liquor stream containing impurities is withdrawn from the solid liquid displacement zone. Therefore, with regard to claims 1, and 3-15, a liquor exchange occurs at a higher temperature resulting in higher product purity. This method of high temperature solvent exchange is not taught in any one of the references, and as previously stated, though Zeitlin uses high temperature centrifuges, one skilled in the art would not be motivated to combine based on the differences of the process, differences in the objective, and the fact that Scott teaches away from such a concept.

With regards to claims 16, 18-21 and 23-26, in addition to the above discussion, solvent can be exchanged twice. The solvent can be exchanged once before or after the crystallization zone, and then another exchange occurs between the primary and

post oxidation zone. Neither Scott nor Zeitlin teach a solvent exchange between the oxidation zone and post oxidation zone. Therefore, with regard to claims 16, 18-21 and 23-26, neither Scott nor Zeitlin teach a solvent exchange between the oxidation zone and post oxidation zone.

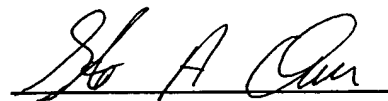
Finally, one skilled in the art would not have a reasonable expectation of success by combining Scott and Zeitlin because, as previously stated, there are large differences in the two processes and different objectives. In addition, there is no teaching of the combination and as previously stated. Scott actually teaches away from a high temperature liquor exchange as used in applicant's invention.

In light of these arguments, applicant respectfully states that there is no *prima facie* case of obviousness, and the rejections under 35 U.S.C. § 103 should be withdrawn.

### Conclusion

Applicant maintains that the application is in condition for allowance. The Examiner is respectfully requested to reconsider the rejection(s), remove all rejections, and pass the application to issuance.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'S. A. Owen', written over a horizontal line.

Steven A. Owen

Patent Agent

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